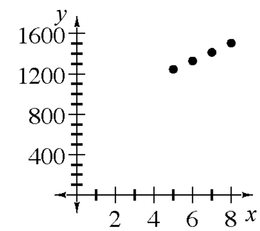
Lesson 10.1.1

10-10. Both equal $\frac{3}{8}$.

10-11. a: $\frac{2}{9}$, b: $\frac{1}{9}$, c: $\frac{2}{3}$

10-12. $\frac{4}{21} \approx 19.05\%$; $k = 0, 6, 10, 12$ are factorable.

10-13. a: See graph at right. The equation of the line depends on the placement of the axes, but the slope is approximately 84.



b: The slope represents the number of new students per year. Depending on the placement of axes, the *y*-intercept would logically be the number of students in year zero, when the school opened.

c: It will get close in 2011, but if the annual increase is 85 to 90 students, it will reach capacity in 2012.

d: Answers vary (700 to 750, based on the 85 to 90 increase).

e: The equation will not justify the answers, because the school would not have been built with only a few students in it.

10-14. $a \le \frac{25}{24}$

10-15. a: 30° or 150°, b: 120° or 210°, c: 45° or 225°, d: 35.26° or 324.76°

10-16. $f(g(x)) = g(f(x)) = x$

10-17. a: 10, b: $10^{0.8} = 6.310$, c: 5.9

10-18. a: $\frac{9}{19} \approx 47.4\%$, b: $\frac{10}{19} \approx 52.6\%$, c: $(\frac{9}{19})^2 \approx 22.4\%$

10-19. a: 5 ways, b: 6 ways, c: 11, d: $\frac{5}{11}$

10-20. $0.6 \cdot 0.5 = 0.3 = 30\%$

10-21. $y = 6$, $z = 2$

10-22. a: 4, b: 200

10-23. a: $\frac{\pi}{6}$, b: $\frac{\pi}{12}$, c: $-\frac{5\pi}{12}$, d: $\frac{7\pi}{2}$

10-24. $y = -\frac{1}{4}(x-2)(x+2)^2$

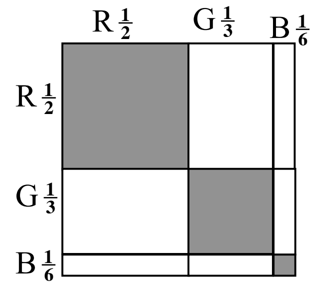
10-25. a: 16.01', b: 89.5°

10-26. a: $\frac{160\pi}{3}$, about 167.6 cubic feet; b: 6 feet; c: It is not changing (angle ≈ 68.20°).

Lesson 10.1.2

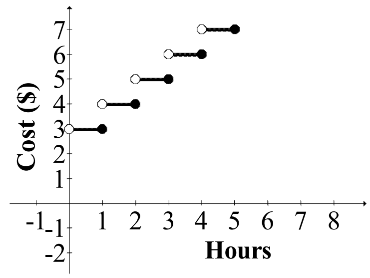
10-38. **a: See diagram at right.**

b: The probability of getting any color twice is: $P(RR)+P(GG)+P(BB)=\frac{1}{4}+\frac{1}{9}+\frac{1}{36}=\frac{14}{36}=\frac{7}{18}$, so $P(GG$ given both the same$)=\frac{1}{9}\div\frac{7}{18}=\frac{2}{7}$.



10-39. $\frac{2}{9}$; **$k=7, 8$ are factorable.**

10-40. **a: \$4.00**
b: \$4.00
c: \$4.00; \$5.00
d: See graph at right.
e: No; it is a step function.



10-41. **blue block: 8 grams,**
red block: 16 grams

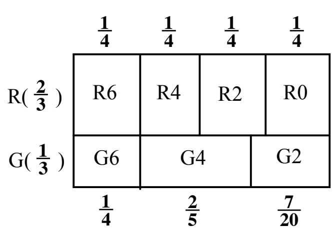
10-42. $\frac{3}{x+5}$

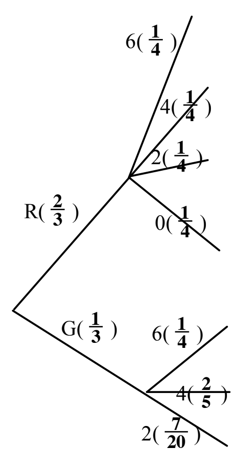
10-43. $\frac{x}{x+2}$

10-44. **4.27 years**

10-45. **a: $\frac{4\pi}{5}$, b: $\frac{15\pi}{9}$, c: 100°, d: 255°, e: 1710°, f: $\frac{11\pi}{9}$**

10-46. **a:**





b: $\frac{1}{4}\cdot\frac{2}{3}+\frac{1}{4}\cdot\frac{1}{3}+\frac{1}{4}\cdot\frac{2}{3}+\frac{2}{5}\cdot\frac{1}{3}=\frac{11}{20}$

c: $\frac{2}{3}\cdot\frac{1}{4}=\frac{1}{6}$

d: $1-\frac{1}{6}=\frac{5}{6}$, e: $\frac{7/60}{17/60}=\frac{7}{17}$

10-47. **a: $y=2(x+2)^2-3$, $(-2,-3)$**

b: $(x-1)^2+(y-3)^2=10$, $(1,3)$

10-48. $(\frac{1}{2}, 6, -3)$

10-49. $x^2 + 25$

10-50. $2, \pm 5i$

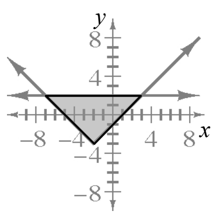
10-51. a: $\frac{\sqrt{2}-\sqrt{2}i}{4}$, b: $-\frac{1}{2}-\frac{\sqrt{3}}{2}$

10-52. $\pm\frac{15}{17}$

10-53. a: $\frac{x+1}{x^2-4}$, b: $\frac{x+6}{2(x+2)^2}$, c: $\frac{1}{x}$, d: $-\frac{1}{2}$

10-54. a: $x = 32$, b: $x = \frac{1}{6}$

10-55.



Lesson 10.2.1

10-62. a: 24
b: The decision chart tells how many branches there are at each stage.
c: $\frac{1}{6}$

10-63. $9! = 362,880$

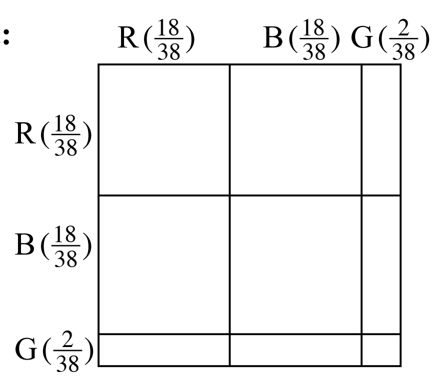
10-64. $9! = 362,880$

10-65. $5! = 120$

10-66. a: 20, b: 30, c: 36

10-67. a: $8! = 40320$, b: $2 \cdot 7! = 10080$, c: $2 \cdot 6! = 1440$

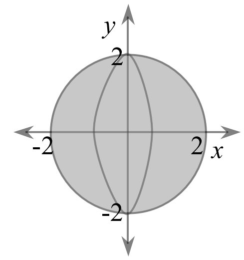
10-68. a:



b: $\frac{18}{38} \cdot \frac{18}{38} = \frac{81}{361} \approx 22.44\%$
c: $\frac{81+81+9}{361} = \frac{171}{361} = \frac{9}{19} \approx 47.37\%$
d: $\frac{81}{361} \div \frac{171}{361} = \frac{81}{171} = \frac{9}{19} \approx 47.37\%$
e: They are the same; $\frac{9}{19}$.

10-69. one point of intersection: (2, 2)

10-70. See graph at right; a sphere, $V = \frac{32\pi}{3}$ cubic units.



Lesson 10.2.2

10-76. $\frac{1}{10!}$

10-77. The first is bigger, because $3! > 2!$

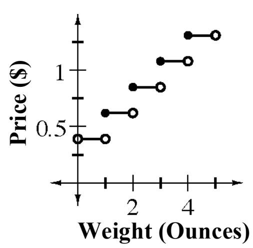
10-78. a: $(n-3)(n-4)(n-5)(n-6)(n-7)$; b: $n+2,\ n+1,\ n,\ n-1,\ n-2$;
c: $n(n-1)(n-2)$; d: $(n+2)(n+1)n(n-1)$

10-79. a: 1
b: $\frac{8!}{0!}$; If $0! = 0$, you would be dividing by 0.
c: $\frac{3!}{3} = 2!$, $\frac{2!}{2} = 1!$, $\frac{1!}{1} = 0!$

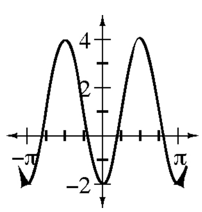
10-80. a: $\frac{14}{50}$, b: 1, c: 0, d: $\frac{27}{50}$

10-81. $\frac{19}{29} - \frac{4}{29}i$

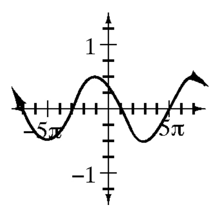
10-82.



10-83. a:



b:



Lesson 10.2.3

10-89. 220

10-90. a: 60, b: 840, c: 56, d: 720

10-91. a: $12, (12-1), (12-2), (12-3)$; b and c: $n(n-1)(n-2)(n-3)(n-4)(n-5)$

10-92. 15

10-93. ${}_6P_4 = 360$

10-94. a: There is one way to choose all five. $\frac{5!}{5!0!} = 1$. In order to have the formula give a reasonable result for all situations, it is necessary to define 0! as equal to 1.
b: There is one way to choose nothing; $\frac{5!}{0!5!} = 1$.

10-95. a: ${}_{52}C_2 = 1326$, b: $\frac{{}_{16}C_2}{{}_{52}C_2} = \frac{120}{1326} \approx 0.09$, d: $\frac{{}_{12}C_2}{{}_{52}C_2} = \frac{66}{1326} \approx 0.0498$

10-96. a: ${}_7C_2 = 21$; b: ${}_7C_3 = 35$; c: ${}_7C_4 = 35$;
d: Choosing three points to form a triangle is the same as choosing four points to *not* be part of the triangle. Those four points form a quadrilateral:
${}_7C_3 = \frac{7!}{4!3!} = \frac{7!}{3!4!} = {}_7C_4$.

10-97. $\frac{n!}{(n-4)!}$

10-98. a: 45, b: 792, c: 7

10-99. a: $3^2 = 9$, b: $3^0 = 1$, c: $3^3 + 3^1 = 27 + 3 = 30$, d: $-\frac{9}{2}$

Lesson 10.2.4

10-107. a: $\frac{5}{125} = \frac{1}{25}$, b: $\frac{60}{125} = \frac{12}{25}$

10-108. a: ${}_{23}P_3 = 10,626$; b: ${}_{23}C_3 = 1771$; c: $1 \cdot 22 \cdot 22 = 484$; d: $4 \cdot 22 \cdot 21 = 1848$

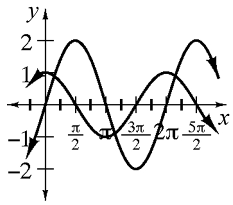
10-109. a: $n = 2$; $\frac{1}{7}$, b: $n = 0, 1$; $\frac{2}{7}$, c: $n = 3, 4, 5, 6$; $\frac{4}{7}$

10-110. $-\frac{1}{\sqrt{5}}$

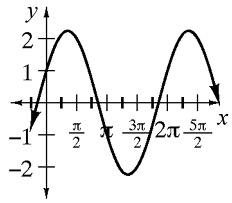
10-111. a: $x = 4$, b: $x = 9$

10-112. approximately 278 months or 23 years

10-113. a:



b:



10-114. a: no; b: No number of trials will assure there are no red ones; c: not possible.

10-115. $x^3 + 8 = (x+2)(x^2 - 2x + 4)$

10-116. a: $3+2i$, b: $1+4i$, c: $5+i$, d: $-\frac{1}{2}+\frac{5}{2}i$

Lesson 10.2.5

10-124. ${}_{12}C_5 + {}_{12}C_4 + {}_{12}C_3 + {}_{12}C_2 + {}_{12}C_1 + {}_{12}C_0 = 1586$

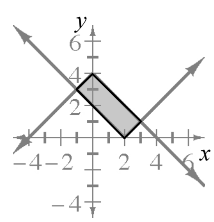
10-125. a: ${}_{10}P_5 = 30{,}240$; b: $10 \cdot 9^4 = 65{,}610$

10-126. a: 243, b: 9.98 years

10-127. a: $-3 < x < 2$, b: $x \le -1$ or $x \ge \frac{7}{3}$

10-128. a: $(x+2-\sqrt{3})(x+2+\sqrt{3}) = x^2 + 4x + 1$, b: $(x+2-i)(x+2+i) = x^2 - 4x + 5$

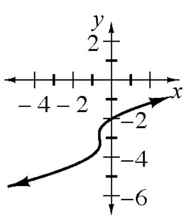
10-129. area = 6 sq. units; graph shown at right



10-130. posts: \$3, boards: \$2, piers: \$10

10-131. a: $f^{-1}(x) = \sqrt[3]{x+1} - 3$

b:

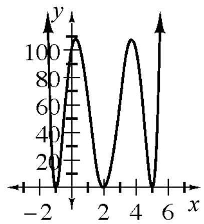


c: Yes; each x is paired with no more than one y.

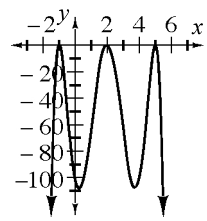
Lesson 10.2.6

10-145. $_6C_3 + 2 \cdot {_6C_2} + {_6C_1} = 20 + 2(15) + 6 = 56$

10-146. **a: double roots at –1, 2, 5**



b: same as previous except flipped over



10-147. **3, 4, 5;** $\frac{6}{216}$

10-148. **a: (–4, 0), (–2, 0) and (0, –16); b: domain: all real numbers, range:** $y \le 2$

10-149. **a:** $y = \frac{1}{4}(x+1)^2 + \frac{3}{8}$**, vertex =** $(-1, \frac{3}{8})$**,** $x = -1$
b: $y = \frac{1}{4}(x+10)^2 + 16$**, vertex =** $(-10, 16)$**,** $x = -10$

10-150. **a:** i**, b:** $-\frac{1}{2} + \frac{\sqrt{5}}{2}$

10-151. **a:** $x+3$**, b:** $\sqrt{(x+3)^2 + (y-2)^2}$

10-152. **A torus; students are likely to describe it as a doughnut.**

10-153. **Answers will vary. A good choice would be 4.**

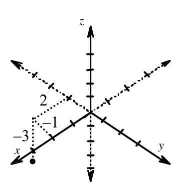
10-154. **a:** $_8C_3 + {_8C_4} = 56 + 70 = 126$
b: If mushrooms are a known topping, then we choose one fewer topping from only 7 remaining toppings so $\frac{_7C_3 + {_7C_2}}{126} = \frac{56}{126} = \frac{4}{9}$.

10-155. **a:** $\log_3(5m)$**, b:** $\log_6(\frac{p}{m})$**, c: not possible, d:** $\log(10) = 1$

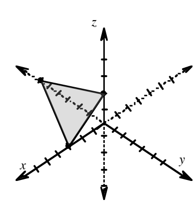
10-156. **a:** $\frac{2x^2-2x-7}{(x-3)(x+1)(x-2)}$**, b:** $\frac{-x^2+2x-4}{x(x-2)}$**, c:** $\frac{x+2}{x-5}$**, d:** $x(x^2 - 2x + 4)$

10-157. **a:** $\pm\sqrt{26}$**, b:** $\frac{-2 \pm \sqrt{10}}{3}$

10-158. **a:**



b:



10-159. **a:** $\sqrt{1224} \approx 34.99$**, b:** $\sqrt{(x+1)^2 + (y+1)^2}$

10-160. **a:** $\sqrt{(x+3)^2 + (y-4)^2}$**, b:** $\sqrt{(x-2)^2 + (y+1)^2}$**, c:** $y = x + 2$,
d: the perpendicular bisector of the segment